

### **REMARKS**

Claims 1-23 remain in this application.

Claims 6, 21 and 22 have been amended to correct editorial errors. In claim 6, on line 1, "magnetoresisance" was misspelled and has been replaced with --magnetoresistance--. In claim 21, on line 7, --layer-- has been inserted after antiferromagnetic. In claim 22, on line 8, --layer-- has been inserted after antiferromagnetic. In both claims the word "layer" was inadvertently omitted. The Examiner is respectfully requested to enter these corrections.

In the Office Action Summary, claims 6, 13 and 17 were indicated as being allowed. In the Response to the Amendment section of the Office Action, the indicated allowability of claim 13 was withdrawn. The Examiner is respectfully requested to correct this contradiction.

### **Section 102(e) rejection of claims 1-4, 7-15, 18, 19 and 21-23**

In section 1 of the Office Action, claims 1-4, 7-15, 18, 19 and 21-23 were rejected under U.S.C. 102(e) as being anticipated by Hasegawa et al. (US 6,496,338).

Applicant respectfully traverses this rejection on the ground that the reference does not teach every element of the claim (MPEP 2131).

First, in his response to Applicant's arguments to this rejection of the prior Office Action, the Examiner maintains that Fig. 3 of Hasegawa clearly illustrates an upper antiferromagnetic layer 46 overlying at least a portion of the free layer 44 as claimed in the present invention. Applicant respectfully points out that because Fig. 3 of Hasegawa is not drawn to scale, it is grossly misleading to rely on this figure to conclude that the upper ferromagnetic layer overlies at least a portion of the free layer. It should be recognized that the width of the free layer 44 is 2

microns (Col. 14, lines 1-4) while the thickness of the free layer 44 is 75 angstroms (Col. 13, lines 59-63). The end regions were removed by a process of photolithography and ion milling which is known to result in steep walls approaching 90 degrees to the plane of the sensor. Clearly the portion of the free layer 44 that the antiferromagnetic layer 46 can possibly overlay is less than 0.00375 of the free layer width that is calculated using a sidewall angle of 45 degrees. If Fig. 3 were drawn to scale, the amount of overlay represented by the sidewall of free layer 44 would be negligible. When taken with the teaching in the Hasegawa reference that "--the antiferromagnetic layer 46 are provided so that the ends thereof cover the sides of the antiferromagnetic layer 41, the pinned ferromagnetic layer 42 and the non magnetic layer 43, and *cover the sides of the free ferromagnetic layer 44* to about half the thickness thereof." (Col. 11, lines 7-12) (emphasis added), the conclusion that the upper antiferromagnetic layer overlies at least a portion of the free layer is not a reasonable one. The antiferromagnetic layer of Hasegawa et al. fails to overlie the free layer and merely abuts the sides of the free layer.

Second, in the response to Applicant's arguments, the Examiner failed to address the second argument presented on page 12 of the paper filed 01/08/2004. The second argument is based on the following limitation of claims 1, 7 and 18:

"an upper ferromagnetic layer overlying and contacting at least a portion of the upper antiferromagnetic layer *on a contact face lying parallel to the sensor surface plane, so that the upper antiferromagnetic layer lies between the upper ferromagnetic layer and the free layer.*" (Claim 1, lines 6-7)(emphasis added)

As pointed out in the argument presented in 01/08/2004 paper, Hasegawa teaches "The ferromagnetic layer 47 on the antiferromagnetic layers 46 are provided so that the ends thereof

cover the *sides* of the free ferromagnetic layer 44 to about half of the thickness thereof." (Col. 11, lines 12-15 and Fig. 3) (emphasis added). The ferromagnetic layer 47 and the antiferromagnetic layers 46 fail to cover the free ferromagnetic on a contact surface that is parallel to the sensor surface plane but rather on a plane more nearly perpendicular to the sensor surface plane. The ferromagnetic layer 47 and the antiferromagnetic layers 46 merely abut the *sides* of the free layer so that the antiferromagnetic layer only comes between the ferromagnetic layer and the free layer over a negligible portion of the free layer on the sides that are *not on a plane parallel to the sensor surface plane*. Applicant submits that the limitation to "--a contact face lying parallel to the sensor surface plane--" clearly distinguishes from the reference and is therefore not anticipated.

Third, in the 01/08/2004 paper, new claims 21-23 were added to more distinctly claim the invention. In the present Office Action, these claims were included in the section 102(e) rejection without any consideration of the new limitations that were recited. These new limitations address the issue of the overlap of the upper antiferromagnetic layer and the ferromagnetic layer over the free layer *in a plane parallel to the sensor surface plane* (Claim 21, lines 8-9, and claim 22, line 10). Applicant believes that new claims 21-23 are patentably distinct from the Hasegawa reference and are therefore in condition for allowance.

In view of the arguments presented above, Applicants submit that the reference clearly fails to teach every element of the claims, therefor the Examiner is respectfully requested to reconsider and to withdraw the grounds of rejection with respect to claims 1-4, 7-15, 18, 19 and 21-23.

**Section 103(a) rejection of claims 5, 16 and 20**

In section 2 of the Office Action, claims 5, 16 and 20 were rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. as applied to claims 1, 7 and 18 above, and further in view of Gill (US 6,052,263).

Since the section 102(e) rejection of independent claims claims 1, 7 and 18 has been overcome (see above section), dependent claims 5, 16, and 20 which depend on claims 1, 7 and 18, respectively, are also allowable, therefore the Examiner is respectfully requested to reconsider and to withdraw the grounds of rejection with respect to claims 5, 16 and 20.

**Allowable subject matter**

Claims 6 and 17 were allowed. Applicant thanks the Examiner for allowance of these claims.

In view of the preceding amendments and remarks, Applicants believe that all the grounds for objection and rejection have been overcome and the pending claims are in condition for allowance and such action is respectfully requested.

Respectfully Submitted



William D. Gill (#44,124)  
Agent for Applicants  
IBM Corporation  
Intellectual Property Law  
5600 Cottle Road (L2PA/010)  
San Jose, CA 95193  
(408) 256-2821